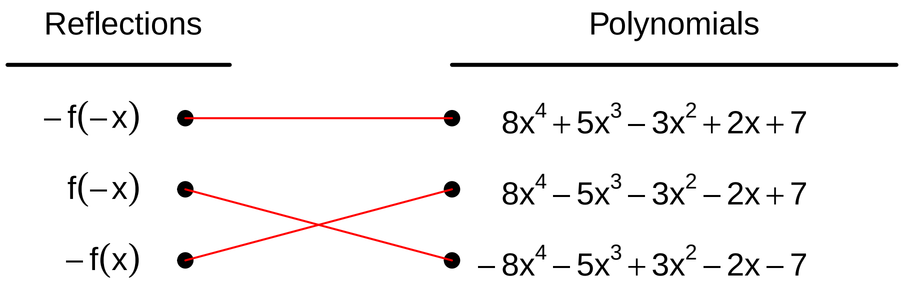
Name: Date:

Exam: Function Reflections (Solution version 618)

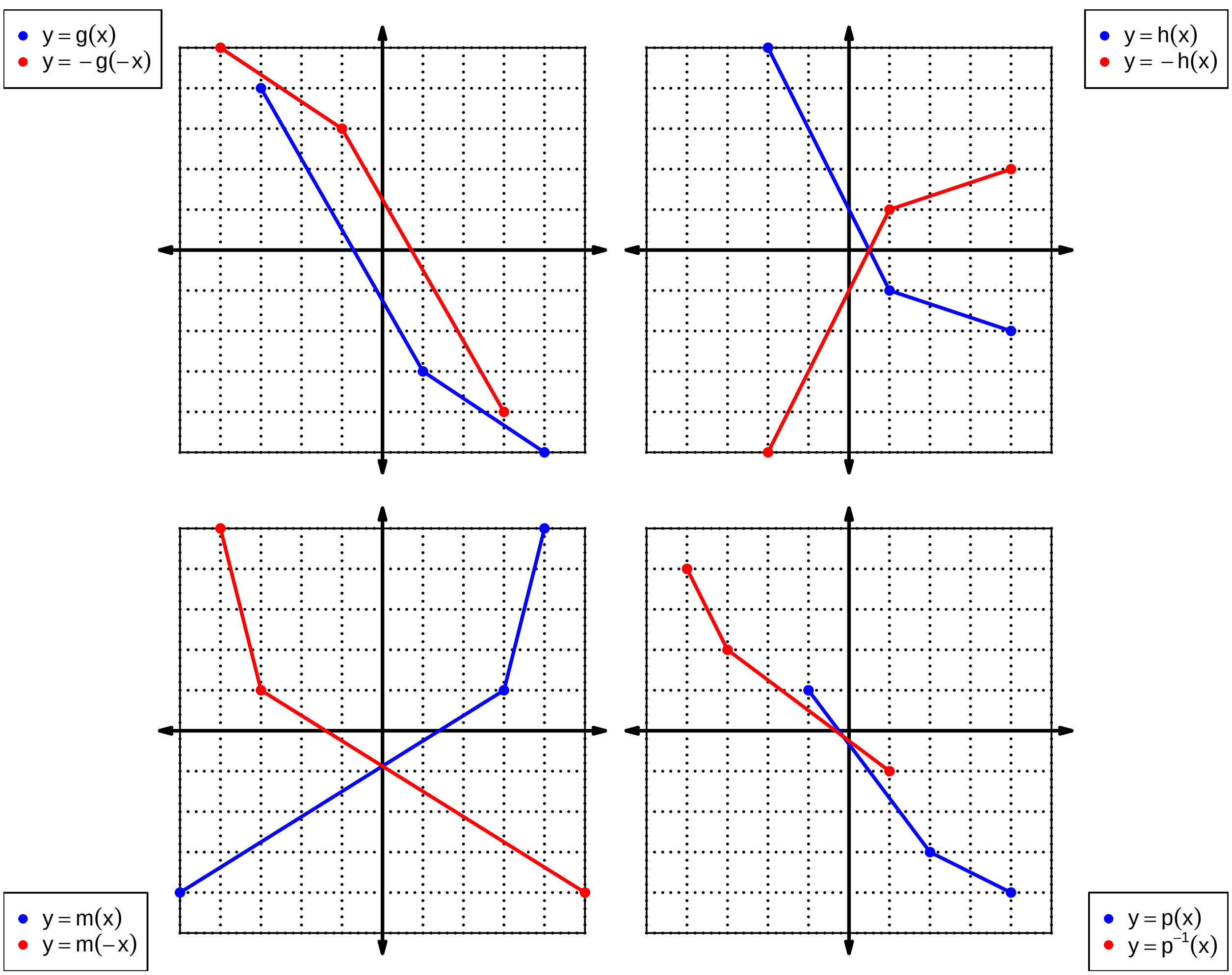
1. (worth 9 points) Let function f be defined by the polynomial below:

$$f(x) \ = \ -8x^4 + 5x^3 + 3x^2 + 2x - 7$$

Draw lines that match each function reflection with its polynomial:



2. (worth 20 points) In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	9	3	5
2	8	9	6
3	5	7	2
4	2	1	3
5	6	4	9
6	3	8	8
7	1	6	1
8	4	5	7
9	7	2	4

3. (worth 3 points) Evaluate $h(8)$.

$$h(8) = 7$$

4. (worth 3 points) Evaluate $f^{-1}(9)$.

$$f^{-1}(9) = 1$$

5. (worth 3 points) Assuming g is an **even** function, evaluate $g(-2)$.

If function g is even, then

$$g(-2) = 9$$

6. (worth 3 points) Assuming f is an **odd** function, evaluate $f(-6)$.

If function f is odd, then

$$f(-6) = -3$$

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7. (worth 15 points) A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
   Let polynomial p be defined with the following equation:

$$p(x) = x^3 + x$$

a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) = (-x)^3 + (-x)$$
$$p(-x) = -x^3 - x$$

b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) = -\left(-x^3 - x\right)$$
$$-p(-x) = x^3 + x$$

c. Is polynomial p even, odd, or neither?

odd

d. Explain how you know the answer to part c.

We see that $p(x) = -p(-x)$ for all x because $p(x)$ and $-p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an odd function.

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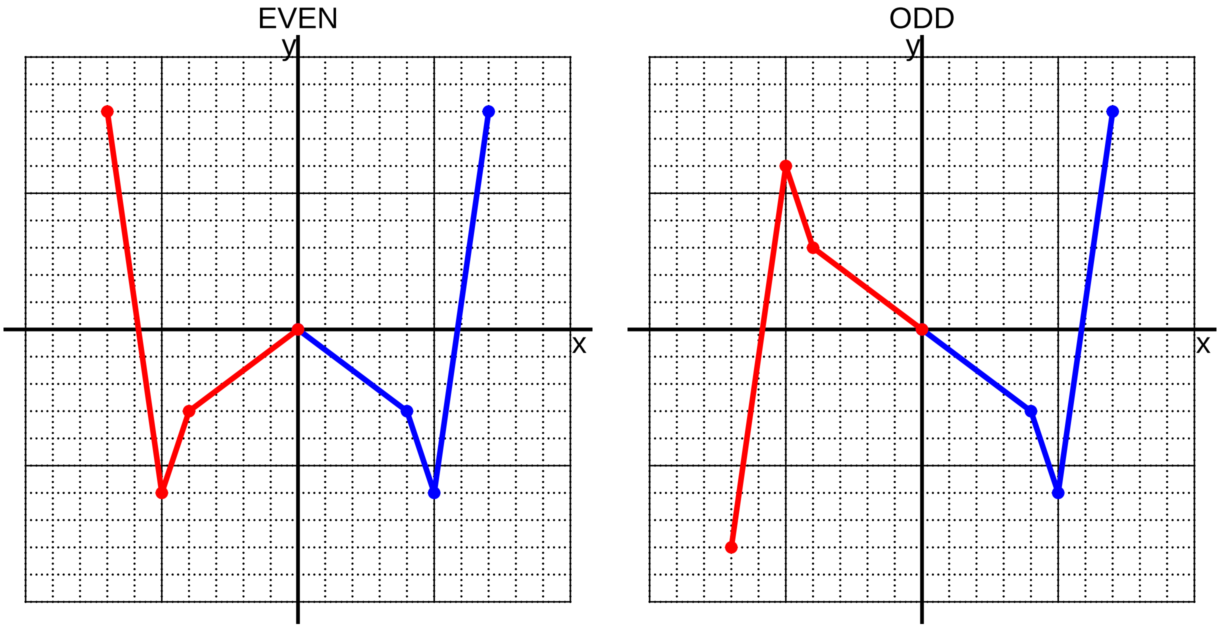
8. (worth 10 points) I have drawn half of a function. Draw the other half to make it even or odd.



9. (worth 10 points) Let function f be defined with the equation below.

$$f(x) = \frac{x}{7} - 3$$

a. Evaluate $f(63)$.

step 1: divide by 7
step 2: subtract 3

$$f(63) = \frac{(63)}{7} - 3$$
$$f(63) = 6$$

b. Evaluate $f^{-1}(5)$.

step 1: add 3
step 2: multiply by 7

$$f^{-1}(x) = 7(x+3)$$
$$f^{-1}(5) = 7((5)+3)$$
$$f^{-1}(5) = 56$$

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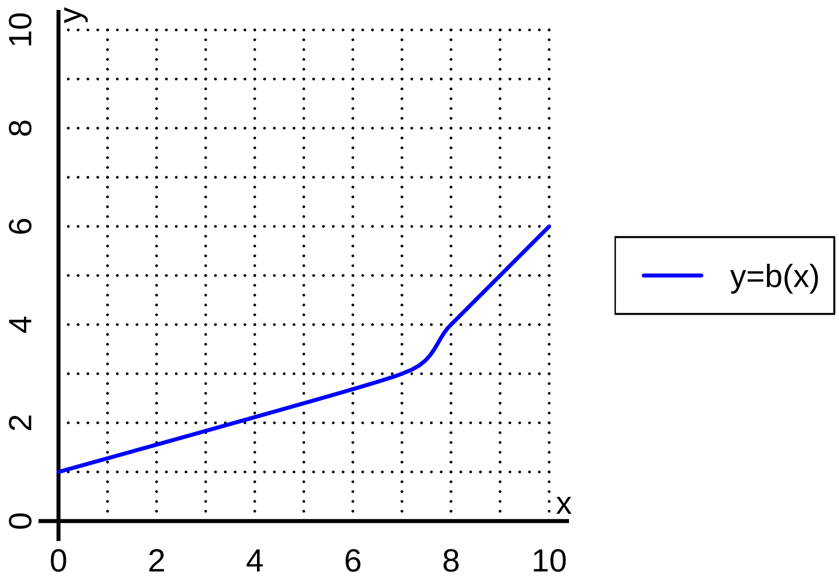
10. (worth 6 points) The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(9)$.

$$b(9) \;=\; 5$$

b. Evaluate $b^{-1}(4)$.

$$b^{-1}(4) \;=\; 8$$

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11. (worth 18 points) Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-5	5	-5	5
-1	6	-6	6	-6
0	0	0	0	0
1	6	-6	6	-6
2	-5	5	-5	5

b. Is function f even, odd, or neither?

even

c. How do you know the answer to part b?

Function f is even because column $f(-x)$ matches column $f(x)$ exactly.